Patent Claims:

1. Brake actuating unit for actuating a motor vehicle brake system of the 'brake-by-wire' type comprising

a) a brake booster which is operable in response to the driver's wish both by means of a brake pedal and by means of an electronic control unit, and a means is provided to decouple a force-transmitting connection between the brake pedal and the brake booster in the 'brake-by-wire' operating mode,

b) a master brake cylinder connected downstream of the brake booster,

c) a means to detect a deceleration request of the driver, and

d) a pedal travel simulator which interacts with the brake pedal and due to which a resetting force acting on the brake pedal can be simulated in the 'brake-by-wire' operating mode independently of an actuation of the brake booster, and which can be enabled in the 'brake-by-wire' operating mode when the force-transmitting connection between the brake pedal and the brake booster is decoupled and can be disabled outside the 'brake-by-wire' operating mode,

c h a r a c t e r i z e d in that the pedal travel simulator (2) is enabled and disabled by electromechanical means (22, 25).

2. Brake actuating unit as claimed in claim 1,

c h a r a c t e r i z e d in that the electromechanical means are drivable by the electronic control unit (7).

3. Brake actuating unit as claimed in claim 1 or 2, c h a r a c t e r i z e d in that the pedal travel simulator (2) includes a movable simulator unit (14) which receives at least one simulator spring (17, 18), with the electromechanical means being formed of a supporting surface (22) for the simulator unit (14) and an electromagnet (25), and with the supporting surface (22) being maintained by the activated electromagnet (25) in engagement with the simulator unit (14) and allowing a translational motion of the simulator unit (14) when the electromagnet (25) is inactive.

4. Brake actuating unit as claimed in claim 3, c h a r a c t e r i z e d in that the supporting surface (22) is designed at a swiveling lever (24) pivoted within limits.

5. Brake actuating unit as claimed in any one of claims 1 to 4, c h a r a c t e r i z e d in that the swiveling lever (24) is mounted in a point (P) which is arranged radially offset in relation to the longitudinal axis of the simulator Unit (14).

6. Brake actuating unit as claimed in any one of claims 1 to 5, c h a r a c t e r i z e d in that the swiveling lever is configured as a power-transmitting lever.

7. Brake actuating unit as claimed in any one of claims 1 to 6,
c h a r a c t e r i z e d in that the pedal travel simulator (2) is not arranged in the flux of forces between the brake pedal (1) and the brake booster (3).

8. Brake actuating unit as claimed in claim 1 or 2,
c h a r a c t e r i z e d in that the pedal travel simulator (2) includes a movable simulator unit (14') which receives at least one simulator spring (17, 18), with the electromechanical means being formed of the simulator unit (14') and an arresting element or transverse slide (31) being operable by means of an electromagnet (25') and arresting the control unit (14') in the 'brake-by-wire' operating mode, while releasing it outside the 'brake-by-wire' operating mode.

9. Brake actuating unit as claimed in claim 8,
c h a r a c t e r i z e d in that a cylindrical component (30) is provided which accommodates at least in part a control housing (29) of the brake booster (3) that contains a pneumatic control valve, the simulator unit (14'), and a resetting spring (15') biasing the simulator unit (14') in opposition to its actuating direction.

10. Brake actuating unit as claimed in claim 1 or 2, in which the pedal travel simulator includes at least one simulator spring,
c h a r a c t e r i z e d in that the simulator spring is configured as at least one leaf spring (32, 33, 34) which is compressed in an angular lever (35) that is rotatable within limits coaxially relative to the brake pedal (1), and in that the electromechanical means is

formed of an arm (36) of the angular lever (35) and an arresting element (38) that is operable by means of an electromagnet (25'') and prevents the angular lever (35) from moving in the 'brake-by-wire' operating mode.

11. Brake actuating unit as claimed in claim 10, c h a r a c t e r i z e d in that the angular lever (35) is equipped with an elastic damping means (39) which is used as a stop for the simulator spring (32 to 34) and safeguards a progressive characteristic curve of the simulator spring.

12. Brake actuating unit as claimed in claim 8 or 9, c h a r a c t e r i z e d in that the pedal travel simulator (2) is arranged in the flux of forces between the brake pedal (1) and the brake booster (3), preferably coaxially relative to said.

13. Brake actuating unit for actuating a motor vehicle brake system of the 'brake-by-wire' type comprising

a) a brake booster which is operable in response to the driver's wish both by means of a brake pedal and by means of an electronic control unit, and a means is provided to decouple a force-transmitting connection between the brake pedal and the brake booster in the 'brake-by-wire' operating mode,

b) a master brake cylinder connected downstream of the brake booster,

c) a means to detect a deceleration request of the driver, and

d) a pedal travel simulator which interacts with the brake pedal and due to which a resetting force acting on the brake pedal can be simulated in the 'brake-by-wire'

operating mode independently of an actuation of the brake booster, and which can be enabled in the 'brake-by-wire' operating mode when the force-transmitting connection between the brake pedal and the brake booster is decoupled and can be disabled outside the 'brake-by-wire' operating mode,
c h a r a c t e r i z e d in that the pedal travel simulator (2) is enabled and disabled by electrohydraulic means (40, 47).

14. Brake actuating unit as claimed in claim 13,
c h a r a c t e r i z e d in that the electrohydraulic means is drivable by the electronic control unit (7).

15. Brake actuating unit as claimed in claim 13 or 14, in which the pedal travel simulator includes at least one simulator spring,
c h a r a c t e r i z e d in that the electrohydraulic means is formed of a hydraulic cylinder-and-piston arrangement (40) that is closable by means of an electromagnetically, pneumatically or electro-pneumatically operable valve (47), and a force-transmitting element (44) is interposed between the piston (43) of the cylinder-and-piston arrangement (40) and the simulator spring (44), abutting on which element is a supporting surface (42) for the simulator spring (41).

16. Brake actuating unit as claimed in claim 15,
c h a r a c t e r i z e d in that the piston-and-cylinder arrangement (40) and the force-transmitting element (44) are arranged in a manner radially offset relative to the axis of the brake booster (3).

17. Brake actuating unit as claimed in claim 16, c h a r a c t e r i z e d in that the piston-and-cylinder arrangement (40) is disposed in the engine compartment of the motor vehicle.

18. Brake actuating unit as claimed in any one of claims 15 to 17, c h a r a c t e r i z e d in that the piston-and-cylinder arrangement (40) includes a resetting spring (15) preloading the force-transmitting element (44) in opposition to the actuating direction of the brake pedal (1).

19. Brake actuating unit as claimed in any one of claims 15 to 18, c h a r a c t e r i z e d in that the brake booster (3) is a pneumatic brake booster which includes at least one force-transmitting pin (45) that extends through the booster housing and has a through-bore in which the force-transmitting element (44) is received.

20. Brake actuating unit as claimed in any one of claims 15 to 19, c h a r a c t e r i z e d in that the simulator spring (41) is designed as at least one leaf spring.

21. Brake actuating unit as claimed in any one of claims 15 to 19, c h a r a c t e r i z e d in that the pedal travel simulator (2) is designed as at least one compression spring (52, 53) which is compressed between the brake pedal (1) and an angular lever (42) that is mounted so as to be rotatable within limits coaxially in relation to the

brake pedal (1) and is supported on the force-transmitting element (44).

22. Brake actuating unit as claimed in claim 13 or 14, c h a r a c t e r i z e d in that the simulator spring (49, 50) is arranged in the cylinder-and-piston arrangement (40) and supported on the piston (43) of the cylinder-and-piston arrangement (40).

23. Brake actuating unit as claimed in claim 22, c h a r a c t e r i z e d in that a means (51) to sense the position of the piston (43) is provided.

24. Brake actuating unit as claimed in any one of claims 15 to 19, c h a r a c t e r i z e d in that the simulator spring is accommodated in a simulator unit (14) which is arranged in the passenger compartment of the vehicle in a way radially offset relative to the axis of the brake booster (3).

25. Brake actuating unit as claimed in claim 13 or 14, c h a r a c t e r i z e d in that the simulator spring () is received in a simulator unit (56) which is arranged in the flux of forces between the brake pedal (1) and the brake booster (3), preferably coaxially to said.

26. Brake actuating unit as claimed in claim 25, c h a r a c t e r i z e d in that the simulator unit (56) is configured as a hydraulic piston and forms a closable hydraulic chamber (60) in a component (59) which radially embraces at least the simulator unit (56).

27. Brake actuating unit as claimed in claim 26, c h a r a c t e r i z e d in that the hydraulic chamber (60) is connected to one of the pressure chambers of the master brake cylinder (4) or a pressure fluid tank (5) associated with the master brake cylinder (4).

28. Brake actuating unit as claimed in claim 26, c h a r a c t e r i z e d in that the hydraulic chamber (60) is connected to a low-pressure accumulator (65).

29. Brake actuating unit as claimed in claim 26, c h a r a c t e r i z e d in that the component (59) is configured as an adapter, which radially embraces the brake booster (3) at least in part and is used for the supply of air to the brake booster (3) out of the engine compartment of the vehicle.

30. Brake actuating unit as claimed in any one of claims 26 to 29, c h a r a c t e r i z e d in that the hydraulic chamber (60) is closable by means of an electromagnetically, electro-pneumatically or pneumatically operable valve (62, 66, 67).

31. Brake actuating unit as claimed in claim 13 or 14, c h a r a c t e r i z e d in that the pedal travel simulator is formed of a hydraulic generating cylinder (68) operable by means of the brake pedal (1) and a hydraulic slave cylinder (69) connected downstream of the generating cylinder (68) and having its piston (71) preloaded by the simulator spring (72), with the generating cylinder (69) being closed by way of a

connection to a low-pressure accumulator (74) that can be closed by means of a valve (73).

32. Brake actuating unit as claimed in claim 31, c h a r a c t e r i z e d in that the pedal travel simulator is designed in an adapter (75) which radially embraces the brake booster (3) at least in part and is used to supply air out of the engine compartment of the vehicle to the brake booster (3).

33. Brake actuating unit as claimed in claim 31 or 32, c h a r a c t e r i z e d in that a means (77) to sense the position of the slave cylinder piston (71) is provided.

34. Brake actuating unit as claimed in claims 31, 32 or 33, c h a r a c t e r i z e d in that a means (76) to sense the pressure prevailing in the slave cylinder (69) is provided.

35. Brake actuating unit as claimed in claim 13 or 14, c h a r a c t e r i z e d in that the pedal travel simulator is formed of a simulator spring (78) compressed between the brake pedal (1) and a two-armed lever (79) which is pivoted within limits, whose first arm (80) forms the supporting surface for the simulator spring (78) and whose second arm (81) cooperates with a hydraulic piston (83) of a piston-and-cylinder arrangement (82) having its pressure chamber (84) connected to a hydraulic low-pressure accumulator (85) by way of a closable hydraulic connection.

36. Brake actuating unit as claimed in claim 35, c h a r a c t e r i z e d in that the first arm (80) has an opening (88) which, upon actuation of the brake booster (3) outside the 'brake-by-wire' operating mode, embraces the control housing of the brake booster (3) at least in part.

37. Brake actuating unit as claimed in claim 35 or 36, c h a r a c t e r i z e d in that the two-armed lever (79) is mounted coaxially to the brake pedal (1) or offset with respect to the brake pedal (1).

38. Brake actuating unit for actuating a motor vehicle brake system of the 'brake-by-wire' type comprising

a) a brake booster which is operable in response to the driver's wish both by means of a brake pedal and by means of an electronic control unit, and a means is provided to decouple a force-transmitting connection between the brake pedal and the brake booster in the 'brake-by-wire' operating mode,

b) a master brake cylinder connected downstream of the brake booster,

c) a means to detect a deceleration request of the driver, and

d) a pedal travel simulator which interacts with the brake pedal and due to which a resetting force acting on the brake pedal can be simulated in the 'brake-by-wire' operating mode independently of an actuation of the brake booster, and which can be enabled in the 'brake-by-wire' operating mode when the force-transmitting connection between the brake pedal and the brake booster is

decoupled and can be disabled outside the 'brake-by-wire' operating mode,
c h a r a c t e r i z e d in that the pedal travel simulator (2) is enabled and disabled by a means operable pneumatically, preferably by means of vacuum.

39. Brake actuating unit as claimed in claim 38,
c h a r a c t e r i z e d in that the pneumatically operable means can be operated by a vacuum source provided in the vehicle.

40. Brake actuating unit as claimed in claim 38 or 39,
c h a r a c t e r i z e d in that the pedal travel simulator (2) includes a movable simulator unit (90) which receives at least one simulator spring (91, 92), and the pneumatically operable means is formed of a supporting surface for the simulator spring (91, 92) being designed in the simulator unit (90) as well as an arresting element (97) which is operable by means of a vacuum box (98) and arrests the simulator unit (90) in the 'brake-by-wire' operating mode and releases it outside the 'brake-by-wire' operating mode.

41. Brake actuating unit as claimed in claim 40,
c h a r a c t e r i z e d in that the pedal travel simulator (2) is arranged in the flux of forces between the brake pedal (1) and the brake booster (3), preferably coaxially in relation to said.

42. Brake actuating unit as claimed in claim 41,
c h a r a c t e r i z e d in that a cylindrical component (90) is provided which accommodates at least in part a control housing of the brake booster (3) that

comprises a pneumatic control valve, the simulator unit (90), and a resetting spring (94) preloading the simulator unit (90) in opposition to its actuating direction.

43. Brake actuating unit as claimed in any one of the preceding claims,
c h a r a c t e r i z e d in that means to produce a hysteresis are provided.

44. Brake actuating unit as claimed in claim 43,
c h a r a c t e r i z e d in that the means (19,20,99,100,101) to produce the hysteresis are designed in such a fashion that, with rising stroke of the pedal travel simulator (2), friction forces are generated in addition to the force of the simulator spring (17, 18, 78) which counteract the actuating force acting on the brake pedal (1).

45. Brake actuating unit as claimed in claim 44,
c h a r a c t e r i z e d in that the means to produce the hysteresis are formed of a force-transmitting lever (99) connected to the brake pedal (1) and a friction member (100) which abuts on the force-transmitting lever (99) by the action of the simulator spring (78) and cooperates with a friction surface (101).

46. Brake actuating unit as claimed in claim 45,
c h a r a c t e r i z e d in that the force-transmitting lever (99) and the friction member (100) include inclined abutment surfaces (105, 106) which are so configured that a force component develops when the pedal travel simulator (2) is actuated, urging the friction member (100) against the friction surface (101).

47. Brake actuating unit as claimed in claim 45, c h a r a c t e r i z e d in that the friction member (100) is arranged on a transmission lever (104) being supported on the force-transmitting lever (99) in such a fashion that boosting of the force component occurs which is produced upon actuation of the pedal travel simulator (2) and urges the friction member (100) against the friction surface (101).

48. Brake actuating unit as claimed in claim 45 or 46, c h a r a c t e r i z e d in that the means to produce the hysteresis is arranged in a housing (103) which is pivoted coaxially to the brake pedal (1) on the axis of rotation thereof, with the housing (103) having an arm (102) being supported on the means for activating and deactivating the pedal travel simulator (2).

49. Brake actuating unit as claimed in any one of claims 35 to 37, c h a r a c t e r i z e d in that means (89,110,95) to test the movability of the piston (83) of the piston-and-cylinder arrangement (82) are provided.

50. Brake actuating unit as claimed in claim 49, c h a r a c t e r i z e d in that the means is provided by a tension-force-transmitting connection (89) between the brake pedal (1) and the brake booster (3), and a sensor device (95) sensing the travel of the piston (83).

51. Brake actuating unit as claimed in claim 49, c h a r a c t e r i z e d in that the means is formed of a driving unit (110) which allows actuating the piston

(83) of the piston-and-cylinder arrangement (82) irrespective of the brake pedal (1) and a sensor device (95) sensing the travel of the piston (93).

52. Brake actuating unit as claimed in claim 51, c h a r a c t e r i z e d in that the driving unit (110) is configured as an electromechanical or pneumatic driving unit.

53. Brake actuating unit as claimed in any one of the preceding claims, c h a r a c t e r i z e d in that the brake pedal (1) is adjustably arranged.